



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

[Handwritten signature]

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/778,661 | 02/06/2001 | Glenn H. Rankin | 10003011-1 | 5477 |

7590 04/06/2004

AGILENT TECHNOLOGIES
Legal Department, 51U-PD
Intellectual Property Administration
P.O. Box 58043
Santa Clara, CA 95052-8043

EXAMINER

AMARI, ALESSANDRO V

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2872

DATE MAILED: 04/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/778,661

Applicant(s)

RANKIN ET AL.

Examiner

Alessandro V. Amari

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-46, 48-56 and 58-60 is/are rejected.
- 7) ☒ Claim(s) 47 and 57 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 48, 49 and 53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 48, the phrase, "the stack" is ambiguous since it is unclear which "stack" (the stack of the first reflector or the stack of the second reflector or both) has the refractive indices and optical thickness recited.

Regarding claim 49, the phrase, "the stack" is ambiguous since it is unclear which "stack" (the stack of the first reflector or the stack of the second reflector or both) has the refractive indices and optical thickness recited.

Regarding claim 53, the phrase "the first layer" is ambiguous since it is unclear whether the first layer is part of "a layer" recited in claim 52 and thus lacks antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 42-46, 48-56 and 58-60 are rejected under 35 U.S.C. 102(b) as being anticipated by Lear US Patent 5,633,527.

In regard to claim 42, Lear teaches (see Figures 4-7 and 8) an optical cavity comprising a first reflector comprising a first layer (28, 40) having a non-concave first surface (14) and a planar second surface; and a stack (64) having planar layers, wherein a planar first surface of the stack is juxtaposed with the planar second surface of the first layer as shown in Figure 8, and a second reflector (62) comprising a stack of planar layers, and wherein the first and second reflectors are configured to provide at least one optical path from the second reflector to the first reflector such that light traveling in this optical path traverses the non-concave first surface of the first layer before undergoing reflection back towards the second reflector as shown in Figure 8 and as described in column 20, lines 24-67 and column 21, lines 1-14.

Regarding claim 43, Lear teaches that first layer has an index of refraction that varies as a function of radial distance from an axial center of the first layer as described in column 12, lines 26-48.

Regarding claim 44, Lear teaches that the non-concave first surface is a convex surface and wherein the first layer has a first index of refraction as shown in Figure 8 and as described in column 12, lines 26-48 and column 20, lines 60-67 and column 21, lines 1-14.

Regarding claim 45, Lear teaches that the first layer has a thickness, t , that varies as a function of a radial distance p from the axial center of the layer, wherein the thickness, t , provides a phase delay, $\Delta\phi$, that emulates a delay in phase between a first

Art Unit: 2872

light ray LO and a second light ray L1 reflected off a mirror, the light rays separated from each other by the radial distance p as shown in Figure 8 and as described in column 20, lines 24-67 and column 21, lines 1-14. Although the prior art does not specifically disclose a phase delay, this feature is seen to be an inherent teaching of that element since the varying thickness of the layer will provide a phase delay for the light.

Regarding claim 46, Lear teaches that the non-concave first surface is a convex surface and wherein the first layer has an index of refraction that varies as a function of radial distance out from an axial center of the first layer as shown in Figure 8 and as described in column 12, lines 26-48 and column 20, lines 60-67 and column 21, lines 1-14.

Regarding claim 48, Lear teaches wherein adjacent layers of the stack have different indices of refraction as described in column 16, lines 29-67 and column 17, lines 1-12.

Regarding claim 49, Lear teaches that each of the layers of the stack has a quarter-wave optical thickness as described in column 16, lines 41-46.

In regard to claim 50, Lear teaches (see Figures 4-8) an optical cavity comprising a first reflector (44, 64) having a planar first surface and a non-concave second surface (14); a second reflector (62) having a planar first surface and a planar second surface, and a non-reflecting active region (42) between the non-concave second surface of the first reflector and the planar first surface of the second reflector as shown in Figure 8 and as described in column 20, lines 24-67 and column 21, lines 1-14.

Regarding claim 51, Lear teaches that the first reflector comprises a material having an index of refraction that varies as a function of radial distance from an axial center of the first reflector as described in column 12, lines 26-48.

Regarding claim 52, Lear teaches that the non-concave second surface is a convex surface of a layer having a first index of refraction as shown in Figure 8 and as described in column 12, lines 26-48 and column 20, lines 60-67 and column 21, lines 1-14.

Regarding claim 53, Lear teaches that the first layer has a thickness, t , that varies as a function of a radial distance p from the axial center of the layer, wherein the thickness, t , provides a phase delay, $\Delta\phi$, that emulates a delay in phase between a first light ray LO and a second light ray L1 reflected off a mirror, the light rays separated from each other by the radial distance p as shown in Figure 8 and as described in column 20, lines 24-67 and column 21, lines 1-14. Although the prior art does not specifically disclose a phase delay, this feature is seen to be an inherent teaching of that element since the varying thickness of the layer will provide a phase delay for the light.

Regarding claim 54, Lear teaches that the non-concave second surface is a convex surface of a layer having an index of refraction that varies as a function of radial distance from an axial center of the first layer as shown in Figure 8 and as described in column 12, lines 26-48, column 15, lines 25-34, column 20, lines 60-67 and column 21, lines 1-14.

Regarding claim 55, Lear teaches that the non-reflecting active region comprises a layer of semiconductor material as described in column 14, lines 6-29.

Regarding claim 56, Lear teaches that the non-reflecting active region comprises a quantum well as described in column 14, lines 6-29.

Regarding claim 58, Lear teaches (see Figures 4-8) a method for manipulating light in an optical cavity, comprising providing a first reflector (64, 44) having a non-concave first surface (14) and a planar second surface; providing a second reflector (62) having a first and a second planar surface; and reflecting light between the first reflector and second reflector such that light reflected by the second reflector traverses the non-concave first surface before undergoing reflection at the first reflector as shown in Figure 8 and as described in column 20, lines 24-67 and column 21, lines 1-14.

Regarding claim 59, Lear teaches that the first reflector has a thickness, t , that varies as a function of a radial distance p from the axial center of the layer, wherein the thickness, t , provides a phase delay, $\Delta\phi$, that emulates a delay in phase between a first light ray LO and a second light ray L1 reflected off a mirror, the light rays separated from each other by the radial distance p as shown in Figure 8 and as described in column 20, lines 24-67 and column 21, lines 1-14. Although the prior art does not specifically disclose a phase delay, this feature is seen to be an inherent teaching of that element since the varying thickness of the layer will provide a phase delay for the light.

Regarding claim 60, Lear teaches that the optical cavity is part of a vertical cavity surface emitting laser as described in column 2, lines 54-59, column 12, lines 60-67 and column 13, lines 1-4.

Allowable Subject Matter

3. Claims 47 and 57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. Claim 47 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the non-concave first surface is a planar surface having an index of refraction that varies as a function of radial distance from an axial center of the first layer" as set forth in the claimed combination.

Claim 57 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the non-concave first surface is a planar surface having an index of refraction that varies as a function of radial distance from an axial center of the first layer" as set forth in the claimed combination.

The prior art of record, Lear teaches an optical cavity having a first reflector having a planar surface and a non-concave surface but does not teach that the non-concave surface is a planar surface having an index of refraction that varies as a function of radial distance from an axial center of the first layer and there is no teaching or motivation to modify this difference as derived.

Response to Arguments

5. Applicant's arguments filed 09 January 2004 have been fully considered but they are not persuasive.

The Applicant argues that in the prior art Lear (Figure 8), the light traveling from stack mirror 62 towards stack mirror 64, undergoes reflection in the outer layer of material (44) before traversing the substantially convex, outer surface (14). This contrasts with the Applicant's claim 42 wherein the reflection takes place after traversing the non-concave first surface ("traverses the non-concave first surface of the first layer before undergoing reflection").

In response to this argument, the Examiner takes issue with the Applicant's assertion that in Lear light traveling from stack mirror 62 towards stack mirror 64, undergoes reflection in the outer layer of material (44) before traversing the substantially convex, outer surface (14). There is nothing in the specification of Lear in regard to Figure 8 that teaches or suggests that light is undergoing reflection in the outer layer of material (44). Element 44 is described as a "lens forming region" which includes the non-concave (i.e., convex) surface (14) and which shapes the emission characteristics of the light beam 18 (see also column 20, lines 24-38 of Lear).

Furthermore, the Examiner would like to point out that the Applicant's optical cavity as shown in Figures 5 and 7 and the optical cavity as shown in the prior art, Lear, Figure 8 have the same structure. Namely, both the claimed invention and Lear have a first reflector comprising a first layer having a non-concave first surface (14 in Lear, 516 in Applicant's invention) and a stack of planar layers (64 in Lear, 510, 512 in Applicant's

invention) and a second reflector (62 in Lear, 504 in Applicant's invention) comprising a stack of planar layers. Therefore, there is every reason to believe that that the optical cavities of Lear and the Applicant's will function in the same manner as claimed.

The Applicant further argues Lear does not disclose that part of Applicant's claim 50, reciting "a non-reflecting active region between the non-concave second surface of the first reflector and the planar first surface of the second reflector". Further, the Applicant's assert that light traveling in Lear's "light-active region 42" towards stack mirror 64, undergoes reflection in the "outer layer of material (44) before traversing the "substantially convex, outer surface (14)" in contrast with the Applicant's claim 50 reciting a "non-reflecting active region" that is bounded in part by a non-concave second surface, leading to reflection after light has traversed the non-concave second surface.

In response to this argument, the Examiner would like to point out Lear does teach a non-reflecting active region (42) between the non-concave second surface of the first reflector (14) and the planar first surface of the second reflector (62) as shown in Figures 6-8. Furthermore, as argued above, the Examiner takes issue with the Applicant's assertion that in Lear light traveling in Lear's "light active region 42" towards stack mirror 64, undergoes reflection in the outer layer of material (44) before traversing the substantially convex, outer surface (14). There is nothing in the specification of Lear in regard to Figure 8 that teaches or suggests that light is undergoing reflection in the outer layer of material (44). Element 44 is described as a "lens forming region" which includes the non-concave (i.e., convex) surface (14) and which shapes the emission characteristics of the light beam 18 (see also column 20, lines 24-38 of Lear).

Furthermore, the Examiner would again like to point out that the Applicant's optical cavity as shown in Figures 5 and 7 and the optical cavity as shown in the prior art, Lear, Figure 8 have the same structure as argued previously and therefore there is every reason to believe that that the optical cavities of Lear and the Applicant's will function in the same manner as claimed.

The Applicant further argues that in regard to claim 58, that in the prior art Lear, the light traveling from stack mirror 62 towards stack mirror 64, undergoes reflection in the outer layer of material (44) before traversing the substantially convex, outer surface (14). This contrasts with the Applicant's claim 58 wherein the reflection takes place after traversing the non-concave first surface ("traverses the non-concave first surface of the first layer before undergoing reflection").

In response to this argument, the Examiner would like to point out that this is the same argument provided previously in regard to claims 42 and 50. Therefore, the Examiner responds with the same rebuttal as stated above.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 2872

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava/ra
24 March 2004


MARK A. ROBINSON
PRIMARY EXAMINER